MAGTF to Ship Integration

Scott Boisvert
MAGTF Planning Branch
SID, CD&I
(703) 432-8131
prescott.m.boisvert.ctr@usmc.mil

MAGTF/Ship Integration

- Ensuring that future equipment and capabilities are properly investigated to allow for full operational capability …
- Entry and coordination points
  - CDD Capability Integration Officers (CIO)
  - MCSC Systems Engineering, Interoperability, Architectures & Technology (SIAT)
  - LPO-2 Annual Equipment Fielding & Integration Symposium (EFIS)
  - MCCDC Operations Analysis Division (OAD)

- Other efforts within SID
  - C4
  - Aviation

Not so proud moments

MTVR Trailers

- Sep 02 – Annex B of the MTVR ORD established need for a new MTVR trailer to replace M105, M149, and M353 trailers. This document called for trailers with more repair part commonality, mobility, and survivability.
- Apr 04 – MTVR Trailer program reaches Milestone B.
- Jan 07 – MTVR Trailer CPD is signed and released calling for MTVR Trailer program to be IOC 4th QTR FY07 and FOC 4th QTR FY13.
  - A performance goal – “Transportable on amphibious, maritime prepositioning, and commercial shipping, rail and strategic lift.”
- Nov 10 – SID involvement results in reexamination of requirement due to shipboard stowage and maneuverability concerns.
- Current – MTVR Trailer design remains essentially unchanged
  - Minimal weight reduction
- Desired End Result – involvement from all parties at the initial stages of equipment capabilities design would alleviate or lessen the difficulties experienced at the eleventh hour.

Recent Efforts

- ACV 1.1 analysis
  - Supported FMID directly and through OAD as USMC decides future of ACV platform
  - Investigated impacts due to size and weight aboard
    - amphibious ships
    - JHSV
    - LCAC, SSC, and LCU
  - Investigated impacts due to personnel capacity and number of vehicles per company
  - Investigated impacts due to amphibious capability
    - Non self-deploying ACVs significantly impact STOM timeline, unit integrity aboard ship, and embarkation
- JLTV
  - Currently assisting FMID, OAD, SIAT, and DOT&E with similar investigations

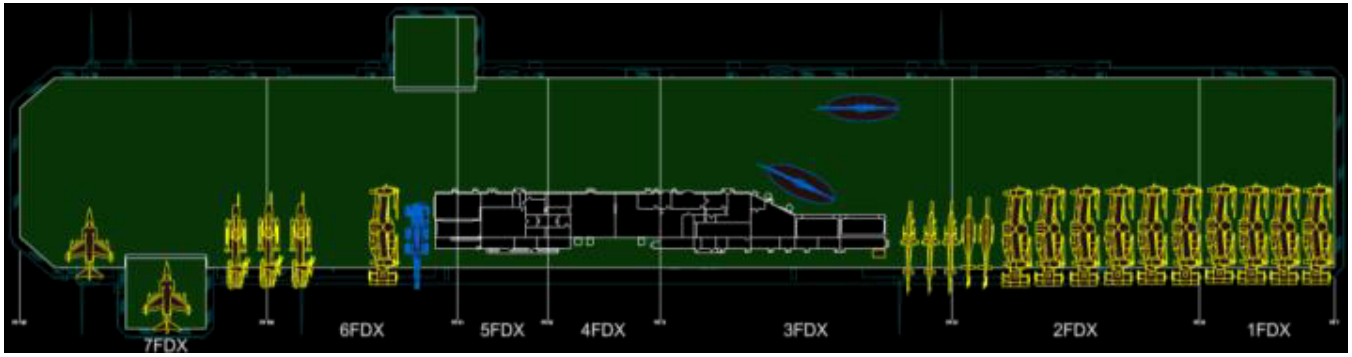
ICODES

(Integrated Computerized Deployment System)

- Logistic software application of ship load-planning tools that utilizes intelligent software agents in a human-computer collaborative mode.
- Includes expert agents (code) with automatic reasoning and analysis capabilities.
- Provides internal virtual representation of the load-planning environment, in terms of ship and cargo characteristics and the complex relationships that constitute the context within which load-planning operations are performed.
- Monitors the principal determinants of cargo stowage
  - placement and segregation requirements for hazardous cargo items
  - trim, list, stress, and bending moments of the ship structure
  - accessibility of stow areas through ramps, cranes, elevators, hatches, and doors
  - correct placement of cargo items in respect to fire lanes, no-stow areas, reserved stow areas, and inter-cargo spacing tolerances
  - accuracy of cargo characteristics (e.g., dimensions, weight, type, and identification codes)

ICODES

LHD Flight Deck



LHD Lower Vehicle Stowage Area

V-MET-V

(Volumetric – MAGTF Embarkation Tool – Vehicles)

- Developed to bridge the gap between “SQFT Calculation Embarkation” and detailed ICODES load development
- Calculates load plans based on ATF / ARG composition, MAGTF EDL, landing craft assignment, and OE&AS
- Accounts for
  - Variable overhead clearance
  - Variable SQFT utilization rate
  - LSD Helo Spot 1 usage
  - Unused well deck SQFT
  - LPD 17 Boat Valley stowage
  - Shipboard MHE
  - Current and future amphibious ships as well as vehicles
- Output is directly importable into ICODES for validation
  - MEU ICODES load planning with V-MET ~ 2 hours
  - MEU ICODES load planning without V-MET ~ 4 days
- Accuracy 98~99% of loads develop in ICODES
- Output feeds STOMM-V and STOMM-S developed by OAD

V-MET-V

V-MET-V Input / Output

Ships	Ship Name Formula	No of SSCs		Change
		Current Run	Previous Run	Required
Ship01	LHA(R) Flt 1	2	2	
Ship02	LPD 17	2	2	
Ship03	LSD 41	2	2	
Ship04	BLANK	0	0	
Ship05	BLANK	0	0	
Ship06	BLANK	0	0	
Ship07	BLANK	0	0	
Ship08	BLANK	0	0	
Ship09	BLANK	0	0	
Ship10	BLANK	0	0	
Ship11	BLANK	0	0	
Ship12	BLANK	0	0	
Ship13	BLANK	0	0	
Ship14	BLANK	0	0	
Ship15	BLANK	0	0	

Utilization Rate: 0.63

Overhead Clearance (in): 4.00

Include Spot 1 on LSD: ☑

Calulate Available SqFt

Auto Stow

Reset

		Space	Height	Width	Weight	SquareFoot	Space	Height	Width	Weight	SquareFoot	S
Gross Values	1 LHA 1	0.0	0.0	0.0	0.0	0.0	1/3LVS	108.0	0.0	40,000.0	10,893.0	2
	2 LHA 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3 LHA(R) Flt 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	L
	4 LHD 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	L
	5 LH(X)	0.0	0.0	0.0	0.0	0.0	LVS	106.0	0.0	40,000.0	27,021.0	M
	6 LPD 4	1/2LVS	92.0	0.0	40,000.0	3,685.0	4LVS	104.0	0.0	40,000.0	1,008.3	3
	7 LPD 17	LVS	95.5	0.0	17,400.0	10,067.9	UVS	128.8	0.0	40,000.0	8,873.9	1
	8 LPD 17 Flt 1	LVS	96.0	0.0	17,400.0	10,068.0	UVS	120.0	0.0	40,000.0	8,874.0	1
	9 LSD 41	TTX	152.5	0.0	100,000.0	2,167.0	BDX	300.0	0.0	100,000.0	3,319.0	H
	10 LSD 49	MVS	156.0	0.0	250,000.0	8,786.9	TAX	171.0	0.0	100,000.0	2,339.4	B
	11 LSD(R)	TTX	171.0	0.0	100,000.0	2,016.0	MVS	171.0	0.0	250,000.0	5,961.0	B
	12 LSD(X)	NDX	159.0	0.0	250,000.0	26,346.0	1MVS	174.0	0.0	250,000.0	15,583.0	2
	13 BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Net Values	LHA 1	0.0	0.0	0.0	0.0	0.0	1/3LVS	104.0	0.0	40,000.0	6,758.6	2
	LHA 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	LHA(R) Flt 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	L
	LHD 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	L
	LH(X)	0.0	0.0	0.0	0.0	0.0	LVS	102.0	0.0	40,000.0	16,815.2	M
	LPD 4	1/2LVS	88.0	0.0	40,000.0	2,321.5	4LVS	100.0	0.0	40,000.0	635.2	3
	LPD 17	LVS	91.5	0.0	17,400.0	6,134.8	UVS	124.8	0.0	40,000.0	5,590.6	1
	LPD 17 Flt 1	LVS	92.0	0.0	17,400.0	6,134.8	UVS	116.0	0.0	40,000.0	5,590.6	1
	LSD 41	TTX	148.5	0.0	100,000.0	1,365.2	BDX	296.0	0.0	100,000.0	2,091.0	H
	LSD 49	MVS	152.0	0.0	250,000.0	5,535.7	TAX	167.0	0.0	100,000.0	1,078.8	B
	LSD(R)	TTX	167.0	0.0	100,000.0	1,270.1	MVS	167.0	0.0	250,000.0	3,360.4	B
	LSD(X)	NDX	155.0	0.0	250,000.0	16,598.0	1MVS	170.0	0.0	250,000.0	9,817.3	2
	BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

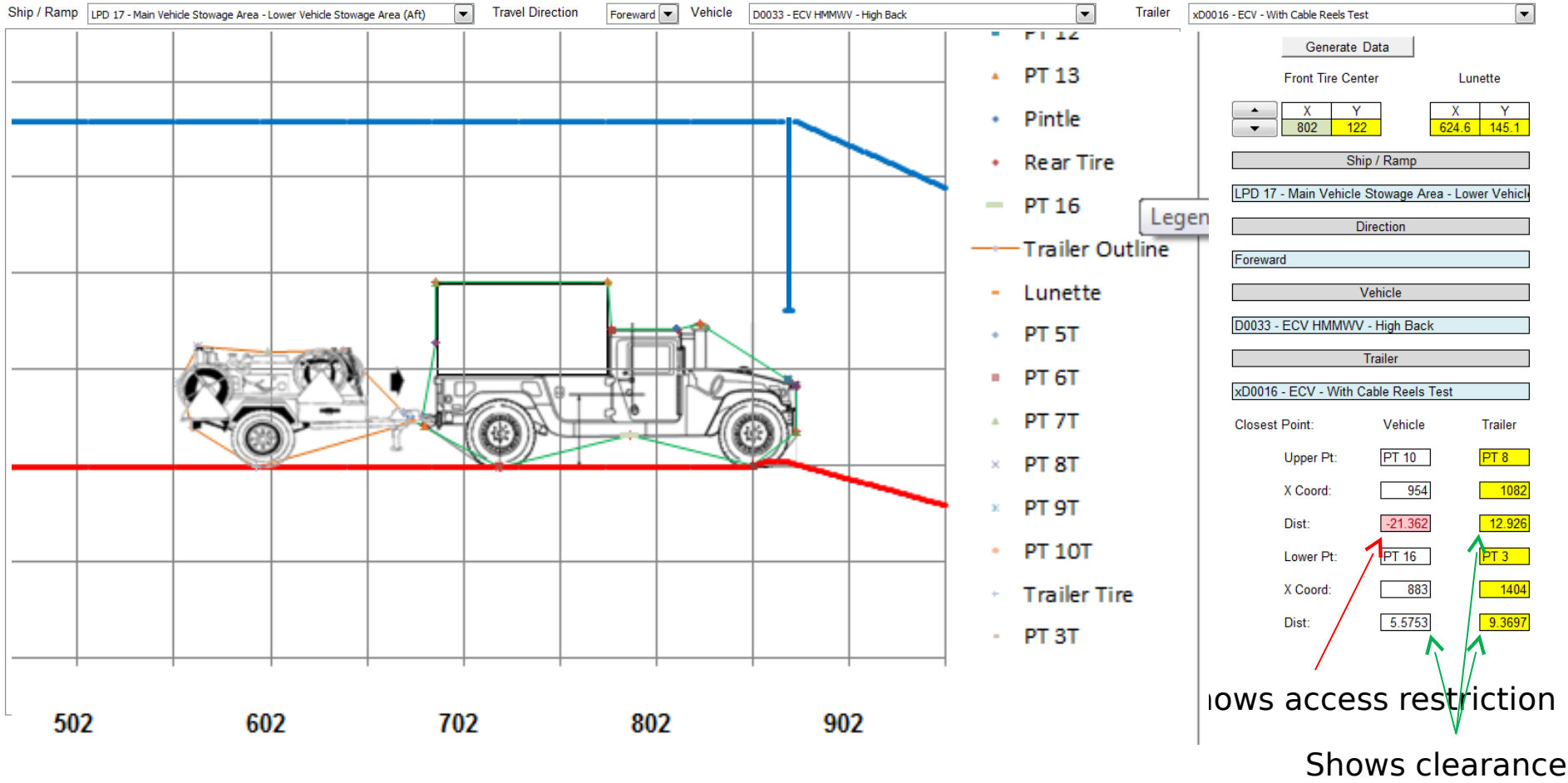
Ship	Class	Total SqFt Rem	Total SqFt Avail	Total SqFt Used	SqFt Did Not Fit	Quantity AAV	EFV	Boat	Quad	SSC
Ship01	**LHA(R) Flt 1**	23.5	15,715.27	15,256.9	**2,823.4**	0	0	0	32	2
Ship02	**LPD 17**	65.3	20,051.22	20,523.8	**1,935.4**	1	14	1	78	2
Ship03	**LSD 41**	33.3	16,431.05	17,441.5	**8,855.3**	0	0	0	84	2
		122.12	52,197.54	53,222.20	13,614.07	1	14	1	194	6

Unit	Ship	Description	Quantity	Item Id	Square	Weight	Height	Space	SqFt Fit	SqFt Did Not Fit
DET, TRANS BN, MLG	Ship03	TRK, ARMORED, TT, W/O WINCH (MTVR)	1	D0003	214.31	40600	156	2/3WDX	214.3069444	0
DET, TRANS BN, MLG	Ship03	TRK, ARMORED, TT, W/O WINCH (MTVR)	1	D0003	214.31	40600	156	2/3WDX	214.3069444	0
DET, TRANS BN, MLG	Ship03	TRK, ARMORED, TT, W/O WINCH (MTVR)	1	D0003	214.31	40600	156	2/3WDX	214.3069444	0
DET, TRANS BN, MLG	Ship03	TRK, ARMORED, TT, W/O WINCH (MTVR)	1	D0003	214.31	40600	156	2/3WDX	214.3069444	0
DET, TRANS BN, MLG	Ship02	TRK, ARMORED, TT, W/O WINCH (MTVR)	1	D0003	214.31	40600	156	0	0	214.3069444
DET, TRANS BN, MLG	Ship02	TRK, ARMORED, TT, W/O WINCH (MTVR)	1	D0003	214.31	40600	156	0	0	214.3069444
DET, TRANS BN, MLG	Ship03	TRLR, MTVR, CARGO , MK105	1	D0862	132.28	19150	156	2/3WDX	132.275	0
DET, TRANS BN, MLG	Ship02	TRLR, MTVR, CARGO , MK105	1	D0862	132.28	19150	156	0	0	132.275
DET, TRANS BN, MLG	Ship03	TRLR, MTVR, WATER	1	D0882	132.28	15240	156	2/3WDX	132.275	0

SITT
(Shipboard Internal Transit Tool)

- Developed to provide initial analysis of vehicle access as they debark landing craft, transit ramps, and enter stowage areas
- Calculates vehicle access based on
  - Ramp angles and stowage area height
    - LHD, LPD 17, LSD 41, and LSD 49 measured in April 2012
  - Vehicle coordinates calculated along 16 individual points
    - Drawings provided by PM allow coordinate extrapolation
- Displays graphic depiction of vehicle at a discreet point along travel from one location to another.
  - Shows clearance and collision points
  - Variable discreet point allows visual analysis of collision point for optimization of vehicle access (decrease height, etc.)
- Component libraries
  - Ship library - ramp angles and overhead/deck obstructions for ships, LCAC, and LCU
  - Vehicle library - ECV, MTVR, LAV-M, and all JLTV vendors concepts
  - Trailer library - ECV trailers
  - Additional ships, vehicles, and trailers added as required

SITT Output
(Highback ECV w/trailer on LPD 17 ramp to LVS Aft)



Graphic above shows ECV and trailer transit aboard LPD 17 from Main Vehicle Stowage to Lower Vehicle Stowage Aft. Red arrows shows point 10 (rear edge of canvas top on ECV) is 21.36 inches too tall and collides with overhead.

VSUM II

(Visual Shipboard Utilization Matrix ver II)

- Developed to provide comparative analysis and impact of vehicle equipment stowage aboard amphibious and prepositioned shipping as vehicle characteristics are changed.
- Calculates vehicle stowage based on
  - stowage area - square foot available and unrestricted height
  - Vehicle - square foot required, height, weight
- Accounts for:
  - Variable overhead clearance
  - Variable broken stow factor
  - Variable break over and kick up angle
- Displays a matrix of percentage of the ship that can be used as well as a graphic of the stowage areas that can be used.

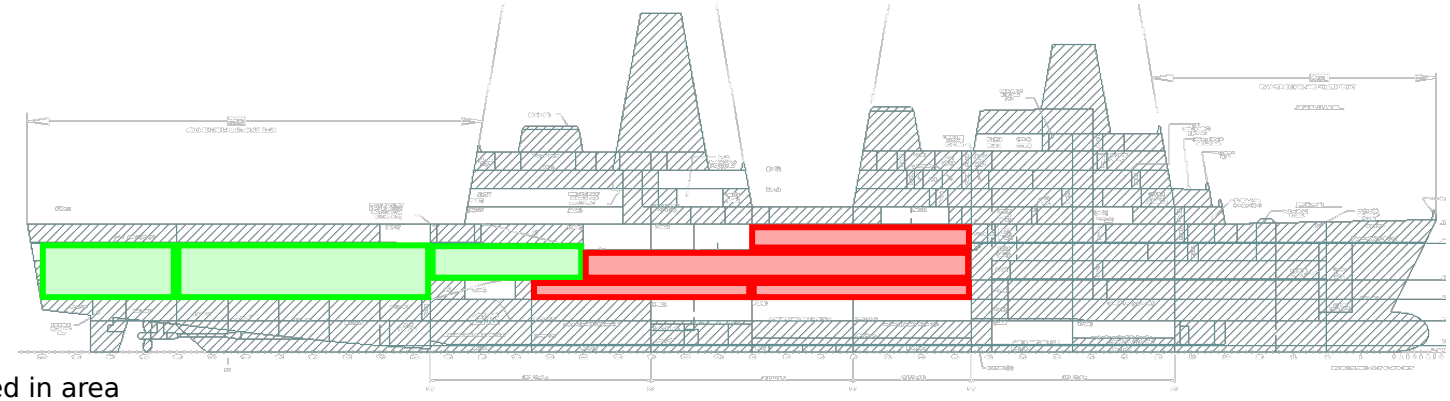
VSUM II Output (LPD 17)

SHIPBOARD UTILIZATION MATRIX

VEHICLE	HEIGHT	SQFT	BREAK OVER
MTVR w/ MCTAGS	156	214.4	6

									TOTAL VEHICLE SQFT	% OF SHIP NOT UTILIZED	% OF SHIP NOT UTILIZED W/O WELL DECK	VEHICLE EQUIVALENTS (CAPABILITY) LOST
MPS												
WATSON CLASS LMSR		B DECK	C DECK	D DECK	E DECK	F DECK	G DECK	MISC RAMPS				
SQFT		62177	69886	56251	52089	47330	30329	12000	330062	78.8%	N/A	849.5
HEIGHT		144	186	156	144	126	90	126				
ACCESSIBLE		NO	YES	NO	NO	NO	NO	NO				
AMSEA	A DECK	B DECK	C DECK	D DECK	E DECK	F DECK	G DECK	MISC RAMPS				
SQFT	21603	23721	28163	22344	19290	19110	8364	8672	151267	100.0%	N/A	493.9
HEIGHT	78	138	102	126	102	114	78	114				
ACCESSIBLE	NO	NO	NO	NO	NO	NO	NO	NO				
WATERMAN	58 FLAT	2ND DECK	3RD DECK	4TH DECK	TANK TOP	78 FLAT		MISC RAMPS				
SQFT	22184	35673	26970	15364	17733	5418		8496	131838	100.0%	N/A	430.4
HEIGHT	78	144	144	90	102	102		102				
ACCESSIBLE	NO	NO	NO	NO	NO	NO		NO				
AMPHIBS												
LPD 17	LOWER V	WELL DECK	MAIN V	UPPER V								
SQFT	9720	9830	11920	8790					40260	75.6%	100.0%	99.4
HEIGHT	93	324	151	130								
ACCESSIBLE	NO	YES	NO	NO								

Excel analysis



= Vehicle can be loaded in area

= Vehicle can be loaded with constraints

= Vehicle cannot be loaded in area

PowerPoint Display

MEU and Prepo Onload Observations

- MEU Onload Obsrvations
  - Obtain current MEU, NSE, and ships vehicle and equipment data to identify trend changes in embarkation
  - Project current trends against future requirements to investigate potential areas for improvement
  - Document requirements and space utilization to influence future ship systems and design
  - Clarify assumptions for Naval Integration and studies
  - Answer NAVSEA, OPNAV, other RFIs regarding specific loading considerations
  - Insight to new capabilities and equipment
    - Jet ski vs LARC for NSE
    - Polaris MV850 ATV for GCE
  - No other HQMC agency tracks this
- Prepositioning Ship Onload Observations
  - Stay abreast of equipment stowage and embarkation techniques
  - Reference loads and pictures for explanation of equipment
  - Current load plans and photos assist with future equipment which may be employed aboard prepo shipping

"The Challenge"

USMC Vehicle & Aircraft Growth

	DESIGN LOADOUT (LPD 17)		CURRENT		NOTIONAL FUTURE (2015 +)
MEU Ground Vehicles and Equipment	M1123 5850 lb (120)	→	M1165A1 9870 lb (120)	---→	JLTV ~?????lb (120)
	M813 5T 20445 lb (40)	→	MTVR w/MAS 43500 lb (40)	---→	MTVR w/MAS 49242 lb (40)
	M1A1 120000 lb (4)	→	M1A1 135200 lb (4)	---→	M1A1 144000 lb (4)
	AAVP7 52000 lb (15)	→	AAVP7A1 55300 lb (15)	---→	ACV 80020 lb (15)
	Ground Vehicles and Equipment up to 3x heavier				
MEU Aircraft	CH-46E 16300 lb (12)	→	MV-22B 46990 lb (12)	---→	MV-22B 46990 lb (12)
	MV-22B weighs almost 3x CH-46E				
	CH-53E 48710 lb (4)	→	CH-53E 48710 lb (4)	---→	CH-53K 60547 lb (4)
	AV-8B 24512 lb (6)	→	AV-8B 24512 lb (6)	---→	F-35B 46413 lb (6)
	F-35B weighs almost 2x AV-8B Harrier				
Notional Aggregate (from above list) embarked MEU	1659 tons	→	2600 tons	---→	~3735 tons

Increased Weights/Density Impact Deck Strength, Ships Stability...